THE LINOTYPE HANDBOOK FOR TELETYPESETTER OPERATION

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A Brief Answer to the Many Questions Publishers are Asking About Applying the Teletypesetter to Their Linotype Operation.

• LINOTYPE •

MERGENTHALER LINOTYPE COMPANY
29 Ryerson Street, Brooklyn 5, New York

PRINTED IN U. S. A.

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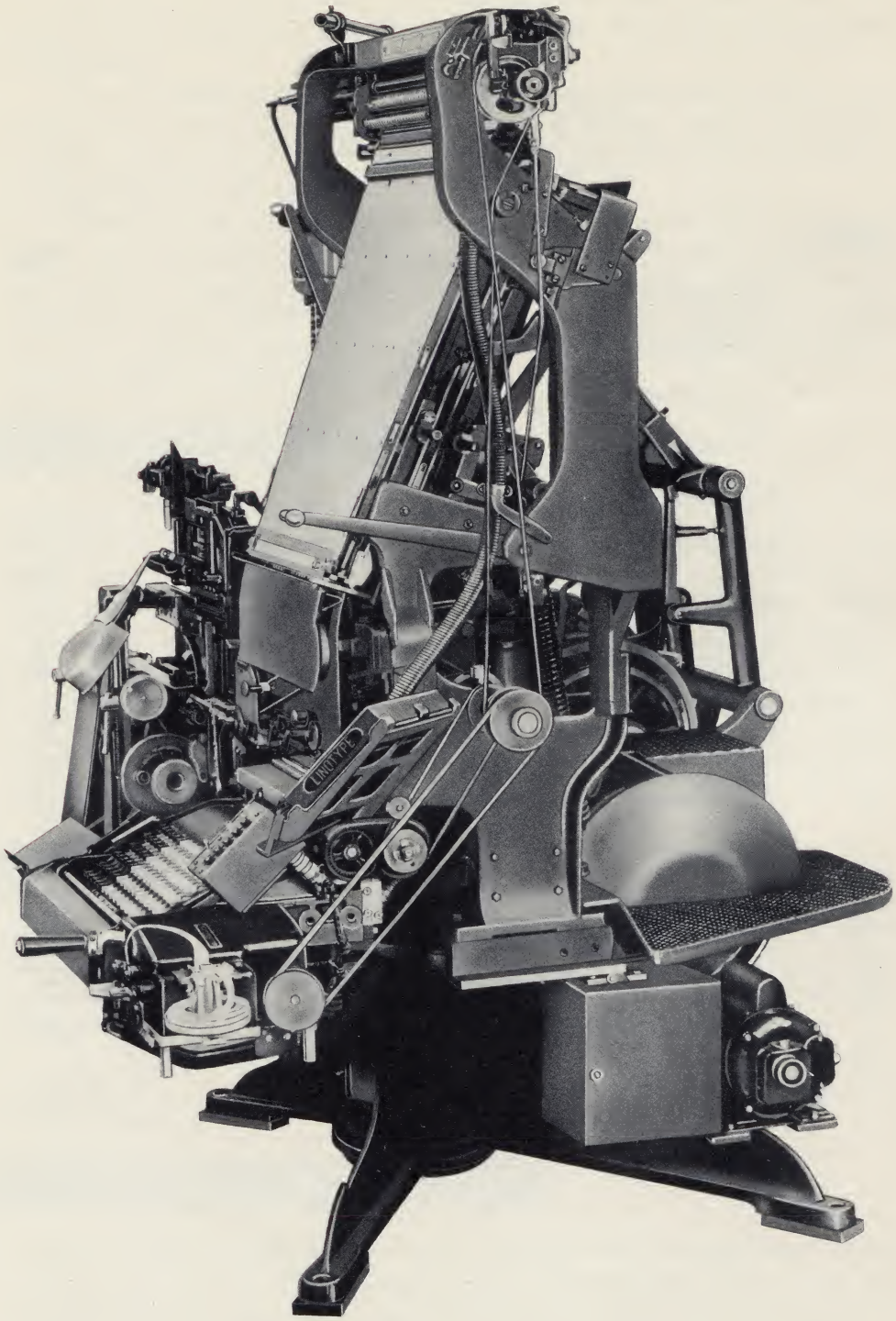


The Blue Streak Comet was designed and engineered for speed and mechanical simplicity, and has proved itself an ideal machine for operation by Teletypesetter. The Comet is capable of steady production at speeds up to 12 column-width lines per minute, and its swing-out front and standard ½ H.P. motor assures easy, economical maintenance. The Comet may be equipped with the Linotype Electric Quadder to quad right, left, or center in response to tape signals.

PREFACE

THERE is nothing fundamentally new in the operation of typecasting machines by means of perforated tape. Many printers and publishers have been using teletypesetting equipment in their composing rooms for years.

However, certain events of the last few years have combined to give new impetus to the growth of teletypesetter installations and to awaken a rapidly increasing interest in teletypesetter operations. Among these was the introduction of the Comet, Linotype's revolutionary new line-casting machine with its speed of 12 lines of newspaper column width per minute.

Refinements in all the techniques of tape operation and extension of its application have gradually evolved over the years, until today it is recognized as a major factor in the fields of printing and publishing.

Therefore, it was decided to produce this manual to assist publishers in their considerations of teletypesetter operations—to acquaint them broadly with developments, to point out the problems and to discuss some of the solutions. By its very nature, it will be evident that this is not a technical treatise for production personnel already skilled in the art of mechanical composition.

If, after reading this handbook, you feel that we have helped you to a greater understanding of this broad field, we will be satisfied that we have been of service to you. That is our sole aim and hope.

MERGENTHALER LINOTYPE COMPANY

THE LINOTYPE HANDBOOK FOR TELETYPESETTER OPERATION

"How Can We Increase Our Typesetting Production? How Can We Lower Composing-room Costs?"

THOSE questions are asked more and more often, as publishers and printers try to solve the operation problems that confront them today.

Linotype Has Acted

THE ANSWER is now offered in the new Blue Streak Comet Linotype, which is ideally suited to operation by Teletypesetter equipment.

With an operating speed up to 12 lines per minute, the new Comet has excited keen interest among cost-perplexed production executives. Its introduction and demonstration at the Chicago Graphic Arts Exposition was a high-lighted feature and a warmly welcomed development.

THE SIGNIFICANCE OF TELETYPESETTER

IN RECENT YEARS more and more plants have installed Teletypesetter equipment. That mechanism was originally conceived for the group operation of Linotypes in separate plants by impulses electrically transmitted from a single point—a facility now used by several chain enterprises.

An early recognized feature of the Teletypesetter was the greatly increased speed obtained by having the keyboarding operation separated from any mechanism of composition associated with normal typesetting on the Linotype. In addition, if the Linotype were speeded up to about 8 lines a minute from its normal speed of 6⅓ lines, it was successfully operated by Teletypesetter with output increases of 25% to 100%.

A further feature of the Teletypesetter is its keyboard arrangement, which is similar to that of a standard typewriter. This adapts it to operation by any skilled typist who learns the necessary principles of type style.

The success of numerous Teletypesetter installations led to the realization that this new means of automatic operation had revealed a need for changes in the basic design of the Linotype. The requirements of typesetting for general purposes, which had developed a machine whose top speed seemed to be about 8 lines, might be narrowed to meet the special conditions in setting body types and thereby permit higher speed.

On the standard Linotype keyboard, originally arranged for the optimum fingering of the most frequently used type characters, the manual production of composition had rarely reached the machine's rate of 6⅓ lines a minute. It was true that "speed-artists," working on machines specially geared, had established records for sustained production by manual operation that meant a rate of 8 or 9 lines a minute, on newspaper body type. But various factors in the operation of many plants across the country have held average production, by manual operation, to about 4 lines a minute.

Perplexed by shortages of Linotype operators and by the constantly rising costs of typesetting, increasing numbers of plant owners have turned to Teletypesetter equipment to get higher output at less cost. Finding it effective with general-purpose Linotypes, they have urged the further need for a step-up in speeds of both the Linotype and the Teletypesetter. The new Blue Streak Comet Linotype is the result.

Tell us about Teletypesetter

FROM many Linotype users comes the request for general information about the Teletypesetter and its possibilities with the new Comet. They want a simple, non-technical description of the mechanism and the general story of its use with Linotypes under modern conditions.

"How does it work?"

"How are operators and machinists trained to handle it?"

"How is it related to wire service?"

"How does a circuit function?"

"What production can be expected from various installations?"

To provide a comprehensive answer to such questions as these, but not as a blanket recommendation for the installation of TTS equipment, Linotype has prepared this handbook. For its review of operating conditions, numerous field studies have just been completed by a fully qualified production expert, not a member of either Linotype or Teletypesetter. Full cooperation has been given by the Teletypesetter Corporation (in which, incidentally, Linotype has no financial interest), and publishers and printers have cordially made their operating experience available for study.

This handbook logically becomes both the answer to questions from the industry and an introduction to the new Linotype Comet which has so rapidly injected new factors for production. But first—the general story of the Teletypesetter System, hereafter called "TTS" for brevity.

HOW TELETYPESETTER WORKS

THE RELATED units of Teletypesetter mechanisms become a system for automatic operation of Linotype machines. All of the typesetting functions of the Linotype are automatically brought into action at high speed, directed by coded signals on a punched tape. This actuates the Teletypesetter Operating Unit which is installed, with an Adapter Keyboard and accessories, on the Linotype. The punched tape has been separately produced on a Perforator, which looks much like a typewriter and has a similar keybutton arrangement.

TTS, the Teletypesetter System, permits the preparation of tape at any desired point, in the composing room or elsewhere. Auxiliary devices for transmission and re-punching permit the transmittal of the tape's signals to any desired distance and to any desired number of duplicating points. It may thus be automatically re-punched at distant points, to operate Linotypes in any desired number of individual plants, however widely separated.

FIGURE 1.—*Standard Perforator* used for composition with unit fonts of Linotype matrices for newspaper body types. The keyboard has a touch system layout, identical with a standard typewriter, plus a few additional keys to control functions of the Linotype. The top speed of the keyboard is 900 keystrokes per minute, or about 150 words. The Perforator automatically counts the set width for each type character and the cumulative total is shown on the indicator scale at the upper right. Proper justification is indicated by two pointers. When a line is completed a single keystroke resets the pointers and another keystroke punches the signal for delivering the line, actuating the Linotype elevator, and the operator is ready to proceed with the next line. The punched tape, shown below, accumulates on a portable spool. This unit is motor-driven and the keys respond to a light and sensitive touch.

The Features of Teletypesetter

WITH a new facility for typesetting speed, plus the flexibility of electrical transmission between units, TTS has shown these outstanding features:

I. Automatic typesetting permits increased machine speeds. TTS produces at 7 to 8 lines a minute, as compared with manual operation, on Linotypes set at the factory at 6⅓ lines a minute (and frequently operated at 4 lines a minute). The new Linotype Comet will operate at speeds up to 12 lines a minute. Thus production increases of 25% to 100% with general-purpose Linotypes will be stepped up substantially by the new Comet with TTS.

II. The perforating of tape, by operators of average proficiency, about doubles the average *manual* operating speed of a general-purpose Linotype.

III. Typists, selected for suitable experience and aptitude, readily learn the essential typographical principles. They can produce usable type within a reasonable time after starting and reach full proficiency within a few months.

IV. Electrical transmission permits group operation of several newspapers or commercial printing plants.

V. Wire services may be received at one central point, edited and sent by TTS to an entire group, with automatic typesetting in each plant.

VI. Electrical transmission permits the simultaneous production, in widely separated plants, of periodicals identical in format and content.

VII. TTS permits the gathering of editorial matter and classified advertising at any number of outlying points, where it may be perforated on tape, electrically transmitted to the newspaper composing room and automatically composed.

VIII. For book, periodical and commercial printing TTS has demonstrated substantial economies in production.

IX. TTS Operating Units may be installed on Linotypes now in use, though new machines are preferable and yield higher production.

When the Teletypesetter was introduced in 1932, it was first used for group operation among several newspapers. But the diversified possibilities of the Teletypesetter System soon led to other applications of the equipment.

The original idea of group or circuit operation by TTS has been developed by numerous groups across the country.

The establishment of news and classified advertising transmission to a central point from outlying offices has been found highly efficient.

Plants at nation-wide distribution centers are using TTS to produce

a great weekly news magazine. Typographically tailored by its editors, it is electrically transmitted and automatically reproduced on a schedule decidedly advanced by TTS.

Book composition and the body type requirements of periodical and commercial printing have been facilitated by the further development of TTS to handle all the roman type faces normally used for such work.

Shortages of skilled operators have been relieved by the training of typists.

Composing-room production and maintenance responsibilities have been realigned with the training of Linotype machinists to tend the machines automatically producing type with TTS. It is found that one monitor-machinist can handle up to four general-purpose Linotypes, and he should be able to handle three of the new Comet Linotypes. He follows the flow of punched tape, the consumption of typemetal, and dumps the composed type—all with available intervals for the normal routines of Linotype machine maintenance.

These various features and advantages of TTS have been studied and applied to local production problems under local conditions. There is so much variety in production factors and methods of cost accounting that this handbook cannot attempt detailed tabulations or individual analyses of installations. But it does present a general survey of TTS operation in

Daily newspapers, local and circuit operation
Weekly newspapers
Book, periodical and commercial plants

The description of the uses of TTS is preceded by brief comment on Teletypesetter mechanisms. Following the uses of TTS are procedures for the selection and training of Perforator operators and monitor-machinists, a summary of typographic data, and a note on the new Comet Linotype.

BASIC EQUIPMENTS FOR TTS

THE illustrations of TTS units in this Handbook, with their explanatory legends, and various comments in the text provide a general idea of the equipment required. What follows, in this section, gives a few more specific details for the technically interested reader. But for complete technical data request should be made for the publications of

Teletypesetter Corporation
1400 Wrightwood Avenue
Chicago 14, Illinois

At this point, however, lest it be felt that TTS equipment requires electrical experts for maintenance and operating routine, it should be stressed that any competent Linotype machinist can readily learn to handle the various TTS units. As with any intricate mechanism, TTS requires regular maintenance, which includes lubrication and cleaning. In those more elaborate installations where wire transmission requires several

electrical devices, their normal maintenance is a comfortable procedure for the trained Linotype machinist. For any unusual problems the experts who maintain press service machines are readily available since the use of Teletype equipment in communications across the continent is very general.

Remember that the TTS devices used for local operation, Perforator and Operating Unit, are wholly mechanical. Only when wire transmission enters the plan of production are electrical devices used—and they are so fully standardized by years of similar uses in world-wide communications activities that this application to the field of automatic typesetting brings no complications.

The Standard Perforator

FEATURES of the Standard Perforator are its basic typewriter keyboard layout, its punch mechanism, and its counting device.

FIGURE 2.—*The Standard Perforator* preparing tape for automatic Linotype operation. As the operator "keyboards" the copy, every letter, character and Linotype machine function is recorded by punched holes in strong paper tape. Moving pointers on the Indicator Scale show precisely when the composed line of matrices, with its spacebands on the Linotype, will justify. When a line is completed a single keystroke resets the pointers. Another keystroke punches the signal for delivering the line, actuating the Linotype elevator, and the operator is ready to proceed with the next line. There are no waits—no mechanical interruptions to slow down the skilled operator.

The Perforator is driven by electric motor which provides power for perforating the tape and for actuating the counting mechanism. The touch on the keyboard is about the same as that of a standard typewriter.

The keyboard, illustrated here, adds certain keys to control functions of the Linotype, but does not lose thereby any of the resources of the touch system of operating. Proficiency in typing by touch system (at least 60 words a minute), is a basic factor in selecting and training operators.

The punching mechanism is based on the selection code shown in Fig. 5 which illustrates a code used for newspaper composition. Through the use of six units a total of 64 different combinations are possible. These are applied with the shift procedure familiar in typewriter construction. Two of the 64 code signals are used to control "shift" and "un-shift," leaving 62 combinations which are doubled by shifting to provide a total of 124 separate selections to control the Linotype keyboard and machine functions.

The code combinations are obtained by punching a maximum of six holes in the tape, which is ⅞″ wide. For each of the six locations on the tape in which a hole may be punched, there is a corresponding code bar in the Operating Unit. On the Perforator six pairs of perforating selector bars and a universal bar extend across the width of the keyboard. The bars are notched with an integrated system which positions a similar series of punch bars. Thus, depressing a given key selects its proper code signal, positions the proper punches for that code, and releases the punching mechanism to make clean holes in the tape at the right locations. All this can happen at a maximum speed of 900 perforations a minute—the equivalent of 150 average words a minute.

The counting device controls proper justification of the composed line. On the manually operated Linotype the operator notes the accumulation of matrices and spacebands—when they reach the normal limit for the length of line he "sends the line in" and proceeds with the next. But in TTS operation the Perforator operator is producing tape with coded holes

FIGURE 3.—*The Perforator Keyboard* has a compact touch system layout similar to a standard typewriter, plus additional keys at either side to control the Linotype functions. The top speed of the keyboard is 900 keystrokes a minute, or about 150 words.

punched in it. The length of the accumulating line is shown by the Indicator Scale, and the spacing to be provided by the spacebands in the line is also indicated. To provide these measurements that will insure a properly justified line requires that the Perforator mechanism must count the width of every type character and also show the remaining portion of the line to be occupied by the spacebands when they expand during the casting operation of the Linotype.

To assure accurate counting, it is essential that a precise relationship be maintained between the counting mechanism and the matrices used on the Linotype. For the Standard Perforator this requires matrices made on the unit system, the details of which are discussed under "Typographic Data."

Unit matrices are made in widths directly proportional to the "em" quad of the type face, each unit being 1/18 of the brass width of the quad matrix (sometimes the capital M is referred to as the basis, the M being equal to the em quad in width). Since some type faces are wider than others in the same point size, this factor is also important in the unit system, as explained later.

With the unit system, eleven groups of various unit widths are used

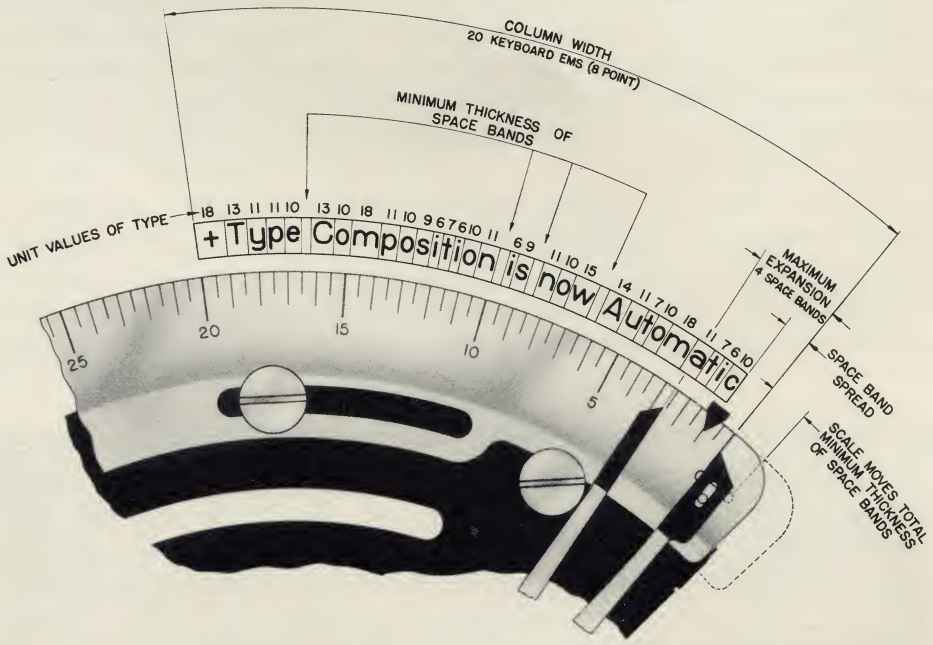


FIGURE 4.—*The Indicator Scale* visualizes the counting system for the operator. The cumulative total of widths of the characters is shown by the moving pointer at the top of the scale. The justification range of the spacebands in the line is indicated by the two pointers at the right end of the scale. Settings of the scale are made to adjust the counting mechanism to various type sizes and widths of line to be composed.

for the entire font of type characters. The narrowest is six units wide, and the unit widths are 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18.

If the mechanical requirement of counting the matrices were based on the use of a single, fixed space between words, as on a typewriter, the whole Perforator mechanism would be much simpler. But conventional type composition demands an even right-hand margin, and that requires "justification" of the words in the line to spread them just enough to completely fill the required measure.

On the Linotype justification is accomplished with spacebands. Each spaceband is made with a pair of thin, sliding wedges. The Linotype justifying mechanism expands these sliding wedges with controlled force that stops when the full measure of the line has been attained by the wedge action.

How to measure the variables of spacing when spacebands are to provide the necessary spread was ingeniously solved in the Perforator. Justification pointers, at the right (Fig. 4), are controlled by the operator's successive strokes on the space bar and provide the necessary guide to completion of the line, either with a completed word or by word division with a hyphen.

In operation, the Perforator's indicator scale has been set for the set-width of the type to be composed and for the measure of the line. As the various characters are touched by the operator's fingers on the keyboard the counting pointer (on the upper edge of the curved scale) moves from left to right. However, when the space bar is struck, the counting pointer remains stationary, but the counting scale (attached to the right-hand pointer) moves from right to left. Each movement of the scale represents the minimum width of the Linotype spaceband, while the left-hand pointer moves a greater distance to the left, corresponding to the maximum thickness of the spaceband.

Thus the counting mechanism not only accumulates the sum of the brass widths of the matrices for a line—it also indicates the total range of spread of the spacebands which will justify the line on the Linotype. In operation, when the counting pointer is between the two justification pointers (as shown in the illustration Fig. 4), then the line may be ended.

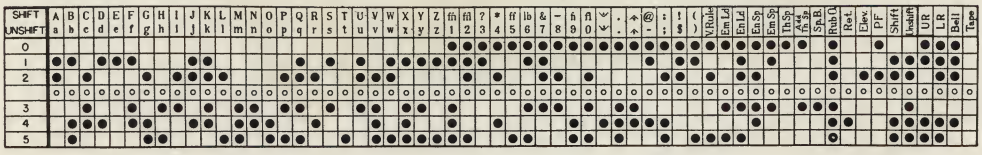


FIGURE 5.—*Teletypesetter Code* as used for American newspaper operation. The signal holes in the tape are represented by the large black dots. The smaller, open dots through the center of the tape are feed holes for the purpose of advancing the tape through the Operating Unit. Each vertical row represents the six possible locations of a complete character or machine function. Perforator operators and monitor-machinists soon learn to recognize the signals and thus to read the tape.

The operator depresses keys for "return" and "elevate"—then proceeds with the next line.

Installation of Perforators will be discussed after the following comment on the Multiface Perforator.

The Multiface Perforator

THE MULTIFACE PERFORATOR was designed to meet the desires of printers and publishers for the application of TTS to the conditions of book and commercial composition and to newspaper composition when unit matrices are not available in the face required. Its general principles are similar to those of the Standard Perforator, the essential difference being in the counting mechanism.

To count an accumulating line of normal (not unit-manufactured) Linotype matrices, it was found that the full font of these matrices could

FIGURE 6.—*The Multiface Perforator* is employed for book and job composition where a variety of type faces calls for the use of regular Linotype (non-unit basis) matrices. It differs from the Standard Perforator by its use of removable counting magazines which are easily interchanged by the operator in a few seconds. The counting magazine provides a means of measuring the widths of 28 different groups of matrices, thus adapting the Teletypesetter system to regular book faces from 5½ to 14 point.

be divided into 28 groups by set-widths. For the basis of counting the em quad (or capital M), is divided into 32 units (as against the 18 units with special TTS matrices). The narrowest characters are 5 units wide, or 5/32 of the em quad.

The Multiface Perforator uses a removable counting magazine instead of the built-in device of the Standard Perforator. The magazine may be removed and another inserted in a few seconds, by the operator, when a change of type face necessitates. Magazines can be provided (or assembled) for any normal font of type from 5 to 14 point. One magazine is included with each Perforator purchased, with additional magazines sold separately by the Teletypesetter Corporation.

For the 32-unit counting scheme, the magazine contains 126 counting blades, in 64 positions. These blades may be noted both in the illustration on page 11, where some of them have been removed, and in the accompanying illustration where they are in position in the partially withdrawn magazine at the right of the Perforator. The counting blades, actuated by the Perforator keys, perform all the necessary selections and similarly control the counting mechanism for the 28 set-width groupings of the matrices.

The counting arrangement is accurate enough to be practical for measures from 6 picas to 25 picas for smaller type sizes, and from 10 to 30 picas for type faces from 8 to 14 point. However, it does not count with absolute mathematical accuracy as does the Standard Perforator since brass widths of the matrices may vary slightly from one face to another. The touch on the Multiface Perforator is slightly heavier than that of the Standard Perforator.

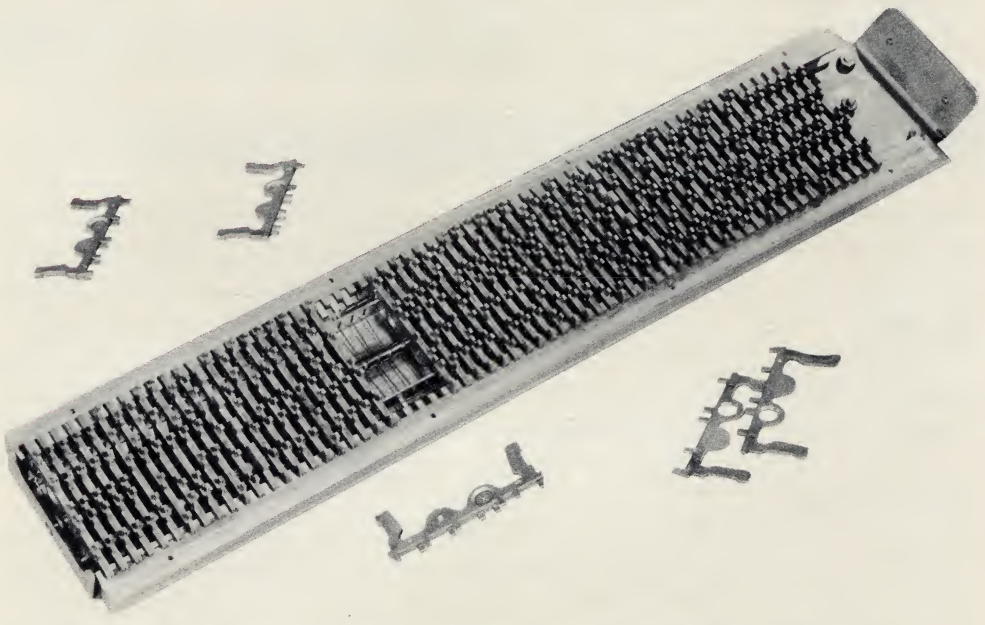


FIGURE 6a.– *Removable Counting Magazine* used in the Multiface Perforator.

Charts are provided to furnish proper settings of the counter and justification indicators. Complete changes of type face and size on the Multiface Perforator can be made in a couple of minutes or less.

Perforator Installations

LOCATION of Perforators is a matter of local preference. For maximum efficiency, and to confine their inevitable clicking noise of operating, a separate and sound-proofed enclosure is usually preferred for larger installations. In smaller installations, the Perforators are frequently located in the composing room or news-room.

The Perforator (either model) is somewhat heavier than a typewriter and therefore requires a sturdy table of the correct dimensions to minimize fatigue of the operator. Height of the table surface from the floor should be 25½ inches, width 24 inches and length 36 inches.

Posture chairs for operators reduce fatigue and thus tend to lessen errors.

Good light is naturally an essential. Fluorescent lights overhead for general illumination plus a flexible-arm fluorescent fixture for each Perforator have been found wholly satisfactory.

Tape for the Perforators must be kept dry and clean. In humid climates it should be stored in a tight cabinet, kept dry by the heat of a light bulb in the bottom of the cabinet.

One roll of tape makes approximately 3200 lines of newspaper composition. Varied colors may be had if desired to indicate either the identity of the Perforator or the purposes of the tape. Tape may be purchased from the Link Paper Company, 220 Broadway, New York City and Paper Manufacturers Co., Fifth and Willow Streets, Philadelphia, Pa.

The Teletypesetter Operating Unit and Adapter Keyboard with Accessories

THE TTS Operating Unit is a mechanical device, designed to be attached to a special keyboard and adjacent mechanisms of the Linotype machine to make it produce automatic type composition. The paper tape, punched on the TTS Perforator, is the medium of control of the Operating Unit.

The Operating Unit consists primarily of a tape feeding and a selecting mechanism (shown at the right side of Fig. 7). It also contains a transfer mechanism, code bars, and related parts which aid in translating the code signals, punched as holes in the tape, into positive mechanical actions on the Linotype.

As shown in the illustration, the Operating Unit must be supplemented by an Adapter Keyboard with accessories. This replaces the standard keyboard of the Linotype machine and contains various elements of the essential linkage to convey the actions as signalled by the tape to the

escapements which release matrices from the Linotype magazine. There are 90 channels in the magazine, each containing a number of matrices for a given character. Since the TTS code system totals 124 selections, it thus provides 34 selections beyond the 90 matrix signals to cover mechanical actions.

Special connecting mechanisms with the Operating Unit provide for the assembling elevator on the Linotype, in which TTS signals control the position of the rail which determines bold face or italic as the alternative to the roman composition. When a line is completed, a perforator signal provides for automatic raising of the elevator, which in turn starts the action of justification and casting.

The Comet may be ordered equipped with an adapter keyboard and accessories for Teletypesetter operation. For publishers who already have modern Teletypesetter equipment, the standard adapter keyboard and operating unit may be transferred to a Comet. However, adapter keyboard accessories are not transferable, and a modification kit must be ordered from the Teletypesetter Corporation to complete the transfer. With these changes, such transferred Teletypesetter equipment will operate at ten lines a minute.

With additional modification, the transferred equipment can be made to produce up to twelve lines a minute. The new mechanisms can be applied in the field by Teletypesetter service personnel.

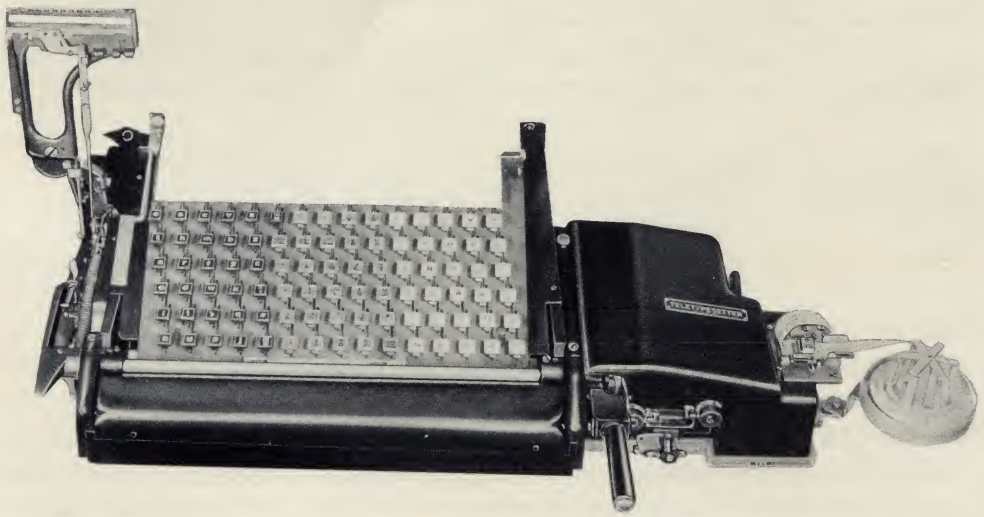


FIGURE 7.—*The Operating Unit,* shown with the Adapter Keyboard. The tape, drawn into the Operating Unit, at the right, is mechanically scanned to translate its code combinations into mechanical actions. Through auxiliary keylevers in the Adapter Keyboard (which also supports the Operating Unit) the escapements of the Linotype are actuated to release the matrices. Other connecting links, tape controlled, release spacebands, actuate the assembler rails, raise the elevator, and (on the new Comet Linotype) control the functions of the Self-Quadder. Operating Units are interchangeable between Linotypes equipped with the Adapter Keyboard.

TTS FOR DAILY NEWSPAPERS

WIDER understanding among plant executives of the mechanical practicability and simplicity of operation of TTS has stimulated the rapid growth of installations in recent years. Impelled by shortages of competent operators and the imperative need for increased typesetting production at lower costs, more and more publishers have turned to TTS automatic operation of their Linotypes.

Today newspapers, large and small, in nearly every state, in Hawaii, in Canada, and in several foreign countries are using TTS to produce papers ranging in size from a compact 8-page daily up to the largest daily newspapers.

TTS Produces All Kinds of Body Matter

DESIGNED originally to handle straight body composition, the TTS has grown with operating experience to include smaller types for classified advertising and larger sizes for editorial matter through 11 point. On a few papers, single-column heads have been handled by TTS, but this has been rather a "stunt" application.

More complicated news matter, in tabular forms, has been readily handled as Perforator operators have learned the typesetting principles. Market reports, stock and bond tables, baseball, racing, and many other sports tabulations, weather reports, produce data, financial tables, vital statistics—all the varied contents of the paper are now routine for TTS.

How Much Equipment Is Needed?

INSTALLATIONS of TTS in the U. S. A. and Canada are summarized in Editor & Publisher's "Annual Tabulation of Mechanical Equipment in 1,690 Plants," September 29, 1951. This shows installations in 39 states, in Hawaii, and in four Canadian provinces, totalling 834 Operating Units and 795 Perforators.

The largest installation thus listed shows 14 Perforators and 9 Operating Units. The number of Operating Units in other plants is 6, 5, 4, and down to a single unit on smaller papers or where a preliminary exploratory test of TTS is being made. Circuit relationship or local operations determine the corresponding number of Perforators in use.

Since TTS encompasses body types, the display requirements of any plant are responsible for machines in number and variety that outnumber Teletypesetter units. This is shown in the following typical TTS operation which makes use of distance transmission but is not part of a circuit TTS plan.

TTS in Use with Its Varied Possibilities

THE CITY is mid-eastern, with a trading area of 340,000. The plant produces 13 editions weekly—morning, evening, and Sunday—with an average of 36 pages each. TTS is used to bring in both news and classified matter from two outlying cities, where it is punched and then sent in by wire direct to the Linotypes. Classified, as taken in through a main-floor office, is perforated when booked and transmitted by internal wire up three floors to the composing room, there to be reperforated and automatically composed. Editorial matter, city and national news, is handled by 8 Perforators placed in a room adjoining the composing room, where 8 Linotypes carry Operating Units. For heads, display and ad guts this plant also has 13 Linotypes and 3 Ludlows.

In this plant all TTS matter is handled by wire—no tape is manually moved from Perforators to Linotypes. Perforators are located at four points (adjacent to the composing room, downstairs in the classified office, and in two outlying cities). The tape they punch goes into transmitters from which wire connections go direct to a central control board in the composing room. There the incoming signals are directed to eight Reperforators which duplicate the original tape for automatic operation of the eight Linotypes—or, when necessary, incoming matter can go into two reserve reperforators which duplicate the original tape for later composition.

Two monitor-machinists are employed in this plant to tend the eight Linotypes in this TTS operation. The Linotypes are Model 8, general-purpose machines, geared for 7½ lines per minute.

A Basic Equipment Plan for TTS Operation with General-Purpose Linotypes

DERIVED from the study of many variables in local conditions, the following equipment and personnel specification may be considered as a basis for the study of any daily newspaper production problem.

This specification starts with the assignment of one monitor-machinist to four general-purpose Linotypes, since many installations are made with Linotypes already in use in the plant. Data for the new Comet are given later.

The equipment:

5 Perforators (one spare included).

4 Operating Units, applied to 4 Linotypes.

The personnel (per 8-hr. shift):

1 Monitor-machinist, tending 4 Linotypes.

4 Perforator Operators.

The production (per 8-hr. shift):

12,800 lines, or approximately 76 columns of body type.

The above plan is "basic" because it represents the probable maxi-

mum use of the monitor-machinist, in tending four general-purpose Linotypes. To keep the machines busy, four Perforators must produce at an average of 400 lines an hour each. That speed in punching tape is often exceeded, though it may take some preliminary time for a beginner to reach it. General observation indicates 400 lines as a fair standard of proficiency on the Perforator, punching 8-point type for 12-pica measure. Actual records vary from a low of 205 to 230 lines to a high of 500 to 600.

Many TTS installations have been made with less than four Operating Units. In those cases, where one to three Linotypes are TTS equipped, the tending machinist has other duties or he is not fully occupied with the TTS equipment. In smaller installations the number of Perforators usually parallels the number of Operating Units *plus* a spare Perforator (for occasional overhaul) and any extra Perforator reserve that may be needed if the entire crew of Perforator operators is to be trained at the start. If one or two *extra* Perforators are installed at the start they are often balanced later with added Operating Units when the Perforator operators have acquired normal speed.

A Basic Equipment Plan for TTS with Comet Linotypes

IN PLANNING for TTS installation on the new Comet Linotypes, the basic factor for full-time personnel efficiency is the assumption that one monitor-machinist will tend three Comet Linotypes. With their increased speed, Comets will require increased frequency in the tender's functions. Perforator speeds remain the same while the lines produced by the Comets go up sharply.

For computing overall plant production with various kinds of industrial equipment, it is customary to figure 50 minutes of net production in each hour. The remaining 10 minutes are assigned to the incidental needs of machine functions. On that basis, three Comets should produce 12,000 lines in an 8-hour shift. Four Perforators will be needed to punch the requisite tape at about 400 lines an hour each.

With this basic approach to a plan for Comet installation and applying a conservative factor of production, we have:

The equipment:

5 Perforators (one spare included).

3 Operating Units, applied to 3 Comet Linotypes.

The personnel (per 8-hour shift):

1 Monitor-machinist, tending 3 Comet Linotypes.

4 Perforator Operators.

The production (per 8-hour shift):

12,000 lines, or approximately 72 columns of body type.

If We Compare TTS with Manual Operation

ASSUMING the rate (often reported) of 200 lines per hour on *manually* operated general-purpose Linotypes, the production data in the foregoing basic plans for TTS operation mean that

8 general-purpose Linotypes, manually operated,
would be required to equal the production
of 4 general-purpose Linotypes with TTS.

9 general-purpose Linotypes, manually operated,
would be required to equal the production of
3 Comet Linotypes, TTS equipped.

3 Comet Linotypes, with TTS, equal the production
of 4 general-purpose Linotypes, with TTS.

Mechanical Considerations in Planning TTS Installation

SINCE Teletypesetter equipment may be installed on machines now in use or on new machines, it follows that the production factors depend upon the condition of the machines. On fairly new Linotypes the machines can be speeded at 8 lines a minute, with net production of about 400 lines per hour. From older machines the net production may be around 300 lines an hour.

For the application of TTS Operating Unit to a Linotype an Adapter Keyboard with accessories is required. This is described later.

Any machine TTS equipped can instantly be switched over to *manual* operation if desired. In some plants corrections are thus handled, though usually marked proofs go back to the Perforator operators for their guidance as well as for punching correction lines.

In a circuit group, using 11 Operating Units, the maintenance costs, for repair parts, have averaged $18 per year per unit. This covers the wire transmission devices as well as the Perforators and Operating Units. This equipment has been used for over 15 years under efficient care and maintenance.

All the mechanical considerations in TTS operation emphasize the wisdom of planning TTS on *new* Linotypes, while the amazing production possibilities for TTS with new Comet Linotypes outweigh by far any other approach to automatic typesetting.

Editorial Routine with TTS Operation

THE established routine of the editorial department needs no readjustments with the installation of TTS operation.

If the publisher decides to have the Perforator operators a part of the news-room organization and located in the editorial department (as often happens), then the copy is either distributed to the operators by the desk,

or it is turned over to a head Perforator operator for distribution to the operators.

If the Perforator operators are located in the composing room, copy may be handled in the conventional manner.

Where the Perforators are located is entirely a matter of local preference. In one newspaper they were first installed just outside the editorial department. Later they were moved to the composing room near the TTS-operated typesetting machines and the production of the Perforator operators increased about 25%. The reason seemed to be psychological—in their earlier isolated location the operators had no feeling of participation in getting out the paper, whereas in the composing room they felt they were a part of the crew and could constantly see the results of their work.

For larger plants the preferred location of Perforators seems to be close to the composing room, in a glass-enclosed and sound-proof room.

The desk of the head operator naturally sees that rush copy is handled first, broken up into takes if necessary to meet deadlines. After the rush copy has been perforated and properly slugged the operators are given time copy. The tape, wound on spools as it comes off the Perforators, is often marked with different colored spring pins, clipped on to distinguish rush copy and time copy.

From a Perforator room outside the composing room, tape may be carried to the typesetters or, as in the plant previously cited, its signals may be electrically transmitted to Reperforators in the composing room.

The handling of classified and legal advertising varies with local conditions. In any case, the TTS production covers only the body matter of such advertising (whether in 5, 5½ or 6 point) while classified display lines, in any other size type, are TTS-set in the classified face to be used as guide lines. Each such guide line also specifies the size for the final setting of that line. In some plants each ad is slugged with its classification number in addition to a guide line. If the head is set in 6-point type it is particularly important that the classification number be slugged at the beginning of each ad.

Where there is a large volume of classified to be set daily, the ads are sometimes classified before they are given to the Perforators. Classified advertisements are normally given out regularly to the operators so that they may be used as time copy and to fill in dead time on the Perforators.

In some operations the Perforator operators are trained as proofreaders. After the peak in their department they are transferred to the proof-room for the peak there.

Corrections may be made by the Perforator operator or manually on the Linotypes. Many plant executives feel it preferable to have the Perforator operators make their own corrections, thus observing their errors and habits of operation. Correction lines should average 3-5% in an efficient plant.

The learning of typographic style is discussed with the training of

operators (page 32). A style book for the paper, as used by most larger papers, becomes doubly valuable when typists are learning the essentials of newspaper type treatment. Certain papers have prepared special style manuals to instruct and guide their Perforator operators in the proper settings of the Perforator for various sizes and measures of type, as well as in the handling and spacing of all the components of the paper.

TTS FOR WEEKLY NEWSPAPERS

PUBLISHERS of weekly papers are beginning to realize the definite advantages of TTS in this field. While their production conditions are wholly unlike those in a daily plant, the shortage of qualified Linotype operators has been equally serious, perhaps even more so, in the weekly field.

On a weekly paper, with the gradual accumulation of news during the forepart of the week, part-time operation of a Perforator is practicable. This becomes an attractive job for a local resident whose experience with a typewriter offers the necessary qualifications for training in typesetting fundamentals. Such part-time operation by the Perforator frees the Linotype operator for other composing room or general plant duties.

The TTS equipment required for a weekly newspaper includes:

1 Standard Perforator or 1 Multiface Perforator.

1 Operating Unit, applied with an Adapter Keyboard, with accessories, to a Linotype machine.

If the product is to include a variety of job composition in type faces other than those especially made for use with the Standard Perforator, then a Multiface Perforator will be required (see page 10). Since the more substantial weekly plants are rapidly growing producers of general printing their typesetting requirements have broadened materially.

One publisher who has used TTS for some time says "its value is indisputable." A qualified Perforator operator, working part-time to produce all the straight matter required, relieves the printer-operators for more ad work and job composition. The body matter for the average 8-page weekly can be punched on the Perforator in less than two days.

The training of personnel is discussed on page 32.

TTS IN CIRCUIT NEWSPAPER OPERATIONS

SINCE IT IS often assumed that the typesetting functions of TTS could readily be tied into the present standard wire services, such as AP, UP, and INS, the reason why this is not possible should be emphasized. That reason is that TTS and the wire services operate on a wholly different code basis. TTS uses combinations of 6 units to control composition of capitals, lower case, figures, points, etc. But the wire services' equipment is all designed around a 5-unit code which transmits only capitals—no lower

case. The familiar web of wire news, streaming out of the Teletype printers in every newspaper office, needs not only editing for local use but a new expression in capitals and lower case to become newspaper body matter.

The foregoing paragraphs form a typical preface to the serious consideration of circuit operation by TTS of a chain or group of newspapers. The same basic conditions that would control a nation-wide hook-up affect any group activity. Agreement on mechanical, typographic, and editorial factors *must* be reached before a circuit operation can be planned.

The executives of a newspaper TTS circuit, continuously operated since 1935, state that they have experienced no major difficulties from its inception. Today numerous circuits are in operation, effecting not only the economical production of TTS in each plant but gaining the further economy of one receipt and one editing of the wire services. The latter factor alone more than justifies the rental of wires and the equipment required.

The Mechanisms of TTS Circuit Operation

TO PROVIDE for the flow of wire copy from one central point to a number of receiving plants, the following basic equipment is required:

Central Distributing Point—

The Standard TTS Perforator—produces tape from the wire copy as edited at the sending point.

The Teletype Transmitter Distributor—converts the punched tape into electrical impulses that may be carried by wire (or radio) over any distance and to any number of plants.

The Teletype Model 20 Receiving-Only Printer—provides a typewritten copy of the outgoing messages.

Receiving Plants—

The Teletype Reperforator—automatically reproduces punched tape under the control of the incoming electrical impulses.

The Teletype Model 20 Receiving-Only Printer (commonly known as Page Printer)—provides a typewritten copy of the text contained in the punched tape.

The foregoing basic equipment is used when interchange of messages among the plants on the circuit is not desired.

When interchange of messages is desired, the Teletype Model 20 Sending-Receiving Printer must be used in place of the Model 20 Receiving-Only Printer at the central distributing point and at each receiving plant. This latter feature has been found to be desirable in some circuit operations.

See a diagram of circuit operation, page 31.

Essentials of Mechanical Uniformity in Circuit Operation

ALL the papers to be circuit-supplied with wire copy should use the same column measure—and 12 picas is virtually standard today.

All the papers must use body type faces having the same set-width (see page 39). This does not mean that the same type face or type size must be used for each paper—Linotype provides a variety of faces and combinations within stated set-widths. Thus there is an opportunity for personal taste or local printing conditions to determine type face selection.

The body of the slug on which the news type is cast need not be identical. One paper can use more leading than another, provided the identical set-width is maintained.

Essential Editorial Agreement for Circuit Operation

AGREEMENT must be reached on a news style, because the tape punched at the circuit headquarters will be duplicated exactly at every receiving point. A conference of the circuit editors accomplishes this essential.

Wire Facilities for Circuit Operation

WHEN agreement has been reached on the mechanical and editorial factors the next consideration is wire facilities. Either telegraph or telephone circuits are satisfactory. (Radio, theoretically practicable, has not been used as yet.)

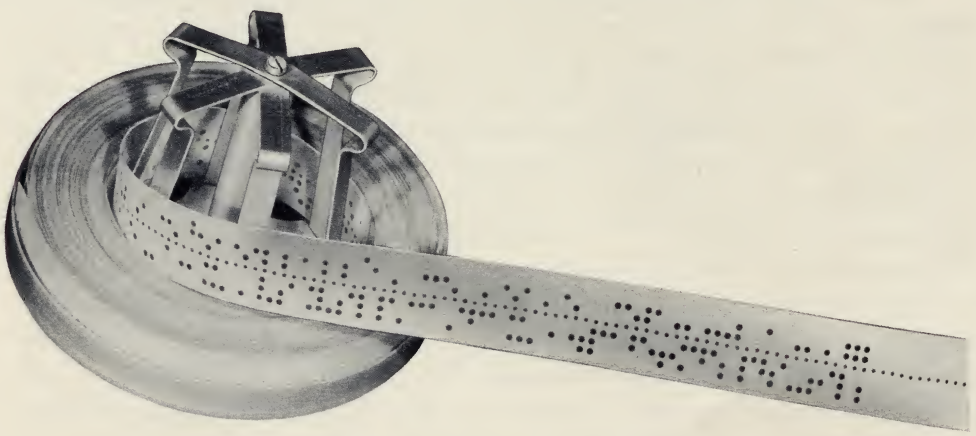


FIGURE 8.—*Teletypesetter Tape* shown here about full size, as it is punched on the Perforator and ready to operate a Linotype machine automatically. The combinations of one to six holes (plus the smaller tape feed hole) are punched in the tape each time a key is touched. A total of 124 code signals are thus provided to control the 90 channels of matrices in the Linotype magazine and other incidental functions.

The "speed" of the wire is important. The most common speed is 317 operations per minute. In other words, 317 operations per minute are available to transmit the code signals of the Teletypesetter tape as converted from the tape by the Transmitter Distributor. This speed has been adequate prior to the introduction of the new Comet Linotype, which has a top capacity of 540 characters a minute, thus establishing a new speed factor for all the related mechanisms.

When a maximum speed has been demanded for an existing circuit operation, the communications company has been asked to furnish a high speed wire. This is capable of transmitting 396 operations per minute.

Mechanical Routine in a Circuit Operation

CIRCUIT operation requires the additional "wire equipment" previously noted, for the electrical transmission and reception of wire copy. While one proficient Perforator operator can produce sufficient tape to supply the circuit with the average flow of wire copy, it is accepted practice to use two operators for a nine-hour day on a seven-day-a-week afternoon newspaper circuit. Two Perforator Units are also recommended for this function.

In the composing room of the headquarters plant, and in each of the receiving plants, only one TTS-equipped Linotype is required to reproduce wire copy. But a second Linotype, TTS-equipped, is normally available on a standby basis which of course may be manually operated and as part of such further TTS equipment as may be locally used.

Since most of the present circuits use only one transmission wire, the basic equipment for the circuit functions of average-sized newspapers is the Transmitter Distributor at the sending point and the Reperforator unit at each receiving plant. The added usefulness has been noted of the Teletype Model 20 Printer which permits editorial judgment of the wire copy before it is set in type. This device is installed at the headquarters sending plant as well as in the various receiving plants. Located in the news room, the Printer receives the wire impulses simultaneously with the Reperforator which is duplicating the original tape. The Printer, functioning as a typewriter, reproduces the tape character for character, in capitals and lower case, and line for line with the tape. Thus the editors receive this copy measured in advance for number of lines that it will set. This advance guide to the length of the story is an advantage in planning makeup.

With this equipment in each plant of a circuit it is customary to allocate two half-hour periods during the day for inter-circuit messages, thus offsetting telephone and telegraph costs that must otherwise occur.

Editorial Routine in Circuit Operation

AS A BASIS for the consideration of the possible formation of a circuit plan of operation, the description of typical routine may be helpful.

The circuit headquarters are usually located in the offices of the newspaper which uses the greatest amount of wire copy. Here the incoming wire services are received and wire copy is processed in the usual manner, either by a circuit editorial staff or by the headquarter's paper regular wire editor.

To insure the identity of copy to be transmitted over the circuit it may be rubber-stamped by the editors with a symbol, such as a large "C."

In the routine of processing the copy, heads are written.

The copy is now ready for transmission to the other plants in the circuit. The copy is delivered to the Perforators (located either in news room or composing room as previously discussed). It may pass through the hands of a copy-cutter, and may go to the headletter machine operator before it reaches the Perforator.

When the circuit-transmission tape is produced on a Perforator located in editorial rooms, it is considered an advantage to have a Reperforator located in the composing room of the headquarter's paper. This acts with all the other Reperforators around the circuit in receiving the circuit copy automatically.

At the receiving offices the Reperforator units may be located in the news room or alongside the TTS-equipped Linotype. In the latter case the duplicate tape is fed automatically into the Linotype. But there is an editorial advantage in placing the Reperforator in the news room, together with a Page Printer to reproduce the copy. Then the editors may edit the tape, using the Page Printer copy as a guide, and send to the composing room only that portion of the tape which will be used. Otherwise, with the Reperforator located in the composing room, and with the duplicated tape going automatically into the Linotype, all the wire copy will be set as transmitted. In that case galley proofs are pulled for editing purposes.

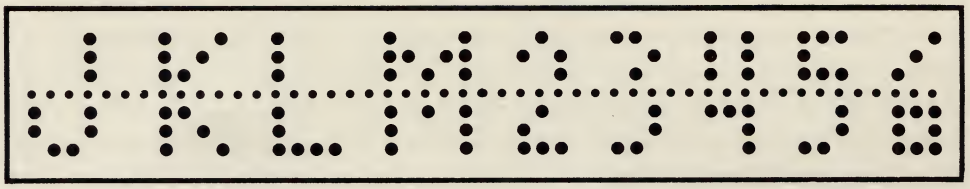
For afternoon newspaper circuits the wire is normally opened at 7 a.m. with a test message which is composed and proofed. When it is established that the circuit is clear and the machines are functioning properly the news budget is transmitted. Following that sports news is filed. In the meantime the headquarter's editors are processing copy that will "stand up," which is filed next. Stories that may change during the morning are held for possible later developments and are not filed until the deadline time approaches. Headlines are transmitted and set in body type, to be used as guide lines.

Each story may be numbered as it is transmitted. The number usually follows the head, in the event that reference need be made to the story during the day. After the paper has gone to press, time copy is transmitted over the circuit.

Since, on the tape itself, it is desirable to classify news stories by importance or content, and feature items by subject matter, many plants have established a system of identification by letter and number. This permits proper handling of the tape and determines its own priority in being placed in the Teletypesetter operating unit on the Linotype.

However, comparatively few persons in the editorial and related departments are capable of reading a perforated tape, and the usual code combinations, if used for identification, would not be recognized. This difficulty can be overcome by "building" regular alphabet characters and numbers on the tape by perforating a series of otherwise unrelated combinations.

For instance, if the perforator keys N, T, T, and spare are struck, the letter J will appear in outline, on the tape. The number 2 may be shown by striking keys B, em leader and W. In the same manner, all alphabet characters and numbers may be formed, as the example below indicates.



Figures and cap characters can be "built" on the tape by striking the keys indicated below. The keybutton designations apply to the standard Teletypesetter Perforator, having the "add-a-thin-space" feature.

TO FORM	STRIKE THESE KEYS	TO FORM	STRIKE THESE KEYS
A	Rubout, PF, PF, rubout.	T	Th. sp., th. sp., rubout, th. sp., th. sp.
B	Rubout, vert. rule, vert. rule, F.	U	Spare, T, T, spare.
C	K, 5, 5, D.	V	Th. sp., E, sp. bar, T, sp. bar, E, th. sp.
D	Rubout, 5, 5, K.	W	Rubout, T, N, T, rubout.
E	Rubout, vert. rule, vert. rule, vert. rule.	X	5, D, I, D, 5.
F	Rubout, PF, PF, PF.	Y	Th. sp., E, V, E, th. sp.
G	K, 5, em ld., period.	Z	5, em ld., vert. rule, 5.
H	Rubout, sp. bar, sp. bar, rubout.		
I	Rubout.		
J	N, T, T, spare.	1	Rubout
K	Rubout, I, D, 5.	2	B, em ld., W.
L	Rubout, T, T, T.	3	5, vert. rule, F.
M	Rubout, E, I, E, rubout.	4	7, sp. bar, rubout.
N	Rubout, E, sp. bar, rubout.	5	2, vert. rule, en sp.
O	K, 5, 5, K.	6	V, Y, Period.
P	Rubout, PF, PF, E.	7	Period, PF, 3.
Q	K, 5, 9, K, T.	8	1, vert. rule, vert. rule, 1.
R	Rubout, PF, PF, X.	9	2, 4, 7.
S	W, vert. rule, vert. rule, comma.	0	K, 5, 5, K.

The tape key should be struck at least twice after each completed figure to allow sufficient spacing between characters. After the code designation has been shown on the tape, the line should be quadded out and justified to prevent trouble when the tape passes through the operating unit.

TTS IN BOOK, PERIODICAL AND COMMERCIAL PRINTING

SINCE the newspaper body types, made in special unit matrices for TTS, are not typographically suited to most kinds of printing in other fields, further engineering studies by Teletypesetter Corporation produced the Multiface Perforator. This development has brought widespread uses for automatic composition. Today *any* normal roman type face up to 14 point, among the many type series made in Linotype matrices, is readily and efficiently composed by TTS, using the Multiface Perforator.

Illustrated on page 10 and described further on page 11, the Multiface Perforator covers its broader field through the use of its 32-unit counting system. This is similar in principle to that of the Standard Perforator but is based on units of 1/32 of the basic dimension of the type face. These more subtle variations cover 28 different set-widths in a font of matrices, sufficient to provide accurate counting and good justification for all normal roman faces, 5 through 14 point.

The two-letter characteristics of Linotype matrices provide bold face or italic and small capitals in combination with the roman faces. Since these duplexed type arrangements are based on the same brass widths the TTS counting system functions for either combination.

Book, Periodical and Commercial Printing

THE FLEXIBILITY of TTS keyboard and tape control which permits the composition of many kinds of tabular matter in newspapers also provides full typographic facilities for book, periodical and commercial printing.

In one of the larger book manufacturing plants TTS has been used for several years with great satisfaction. Their earlier installation was later augmented and today they have TTS equipment on six Linotypes. They are operated three shifts daily, 120 hours a week. Seven Multiface Perforators, operated two shifts daily, or 80 hours weekly, provide the tape to maintain the full production of the six Linotypes. These relationships, 560 Perforator hours balancing 720 Linotype hours, reflect the conditions of book composition.

For the more than 150 fonts of matrices in the above plant which may be specified for TTS composition, a smaller number of Multiface counting magazines has been found practicable. Teletypesetter Corporation specifies that a counting magazine be provided for each font of matrices in the plant, but in larger plants this becomes a considerable invest-

ment. The supervising executive in the above book plant (an experienced expert both in TTS and Linotype mechanisms) has found it possible to adapt a Multiface magazine to any given font of matrices. The key is the brass widths of the matrices. The counting blades of the magazine (shown on page 11) are removed by the plant machinist and rearranged or replaced as required for the newly specified font.

In bookwork or similar composition requiring the use of special characters (normally running "pi" on a manually operated Linotype) the TTS operation provides that the Linotype will stop at the required point in a given line. Then the monitor, who has been provided with covering instructions, inserts the necessary matrix in the Linotype assembler and restarts the automatic operation.

FIGURE 9.—*Operating Unit* installed on a new Comet Linotype. A TTS Adapter Keyboard (not visible) has been built into the machine to integrate the Operating Unit with the Linotype mechanism. The unit is belt-driven from the intermediate shaft of the Linotype to preserve identical speeds. The spool of tape, at the right of the keyboard, on entering the operating mechanisms, is "sensed" or scanned to translate the coded holes into the actions that release matrices, spacebands, operate the duplex rail for bold face or italics, and control the casting function. On the new Comet Linotype the tape also controls the settings for the Self-Quadder.

The keyboard on the Linotype, as shown here, is identical with standard Linotype construction. It can be operated manually the instant the Operating Unit control lever is turned to its "off" position. This facility is frequently used for corrections or other immediate needs.

Special characters for frequently recurring use can be procured with proper matrix tooth combinations to run in the Linotype magazine with a corresponding place on the Teletypesetter keyboard.

Reference has been made in this handbook to the TTS operation which has so successfully speeded up simultaneous production of nation-wide editions of a great news magazine. No special apparatus or techniques have been involved, but a high degree of performance with TTS equipment has been attained by very extensive organization. Every column of editorial matter is written in New York City to a mathematical pattern of exact character count per line. Every run-around, every head and sub-head, every cut and its legend—all the component parts of the page are precisely planned in typographic units of measurement. In the editorial offices TTS Perforators produce tape that is carefully proofread and cross-checked. Then, by wire transmission, the tape is duplicated simultaneously in Philadelphia, Chicago, and Los Angeles.

In such production a separate advance routine covers the transmis-

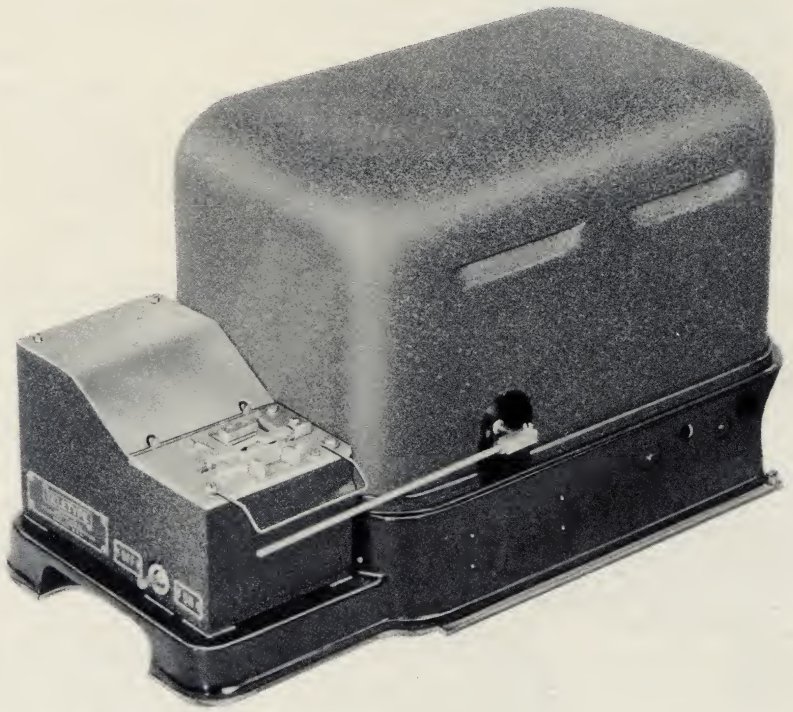


FIGURE 10.—*Transmitter Distributor* (above) is the sending instrument for telegraphic transmission of Teletypesetter tape, the first function in circuit operation of TTS for a group of plants. The tape produced by a Perforator is immediately fed into the Transmitter Distributor, which sends electrical impulses over the wire in accordance with the code holes in the tape. These may be carried to any distance, by telegraph or telephone wire (or by radio). At one or more receiving points, however widely separated, the impulses operate receiving mechanisms, as further shown. A Reperforator is always used to duplicate the tape which is then immediately ready to operate a Linotype machine.

sion of cover plates and of advertising content of each issue. The entire production story is a tribute to modern methods, with TTS furnishing the closest link thus far attained between the deadline in New York City and magazines being printed a few hours later three thousand miles away.

For other periodical printing TTS functions as a local facility for its production economies. Thanks to the Multiface Perforator type formats have unlimited variety, while the reading public has never been aware of any change in production methods.

TTS OPERATING FEATURES ON THE NEW LINOTYPE COMET

IN DESIGNING the new Linotype Comet for the most advantageous use of Teletypesetter, the Linotype engineers have provided a number of new and exclusive features.

The Comet's speed of 12 lines a minute is outstanding news.

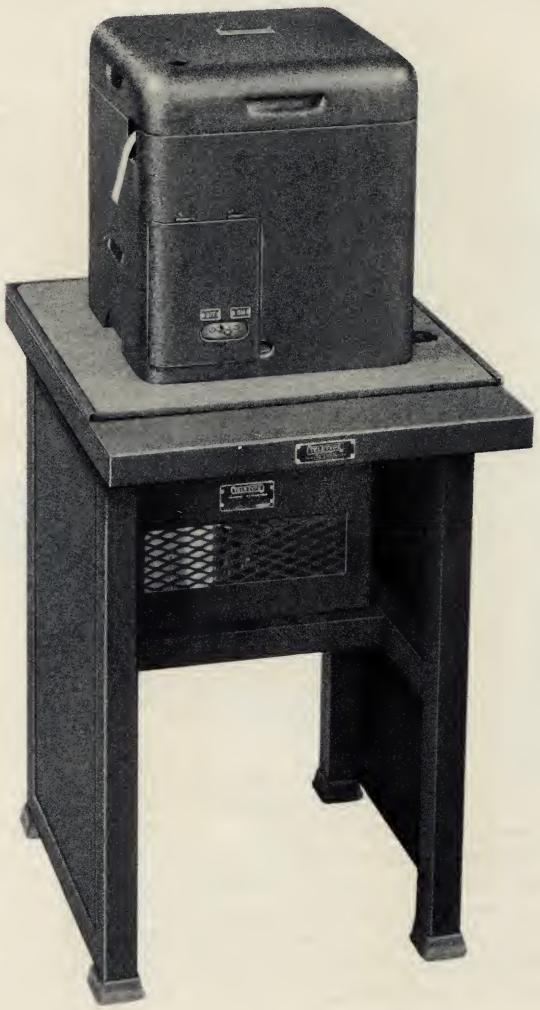


FIGURE 11.—*The Reperforator* (at the left) reproduces the punched tape, identical in every detail with the original transmitting tape, and ready to operate the Linotype. When Perforators are installed away from the composing room, wire transmission via Transmitter Distributor and Reperforator obviates the necessity for carrying the original tape by messenger to the composing room. The wire transmission provides immediate Linotype operation as the tape is punched. The only change necessary in TTS equipment for wire operation is the addition of a tape stop mechanism on the Operating Unit. This automatically stops the Operating Unit (and prevents tearing of the tape) should the operator fall behind, or should transmission cease for any other reason.

The Comet's new Self-Quadder, controlled by TTS tape signals, makes for new production factors. The tape's signals are stored in an electrical "memory circuit" which holds them for cycles of three lines and transmits them to the Quadder at the right time.

TELETYPESETTER SAFETIES

THE BLUE STREAK COMET is equipped with four safeties to prevent down-time on the machine. These safeties are arranged to:

1.—Stop Teletypesetter if Linotype Distributor stops.
2.—Stop Teletypesetter if Linotype Assembler is stopped.
3.—Prevent Assembling Elevator from rising if line of matrices is too long.
4.—Insure last matrix being in front of Assembling Elevator Pawls as Assembling Elevator rises.

FIGURE 12.—*Teletype Model 20 Printer* or Wire Typewriter receives and makes a typewritten reproduction of Teletypesetter tape and is also equipped with keyboard and mechanism for the sending of messages. This permits the two-way interchange of messages on a TTS circuit as well as typewritten reception of regular circuit copy. Must be accompanied by Reperforator for tape reproduction locally.

APPLYING THE OPERATING UNIT TO LINOTYPE MACHINES

MORE FAVORABLE results are obtained by making a TTS installation on *new* Linotypes. But it is possible to install an operating Unit on any Linotype in use, provided that the machine is in good condition mechanically and that its vintage is not too early. Older high-base models cannot be adapted because of basic differences in keyboard relationships. Until the introduction of the new Comet, Models 5, 8, and 31 have been the most frequently specified for TTS operation.

As previously noted, every installation of a TTS Operating Unit must be accompanied by a TTS Adapter Keyboard and accessories. This is a modification of the standard Linotype keyboard, embodying the alterations in design which are essential to the automatic controls of the TTS. When the Adapter Keyboard is installed, it is recommended by the Linotype Company that the plant owner store away the regular Linotype keyboard parts which are thus replaced. By saving these regular keyboard parts the owner may, at some future time, be readily prepared to transfer the TTS equipment, if so desired, and restore the Linotype to its original factory-built condition. This provision against the ultimate necessities of plant renewals over a period of years is well worth consideration.

As received from Teletypesetter Corporation, the Adapter Keyboard consists of a base casting, keylever "shell" and a set of keylevers, with which are combined the lower two rows of keylevers used for manual operation. During the installation the Adapter Keyboard is built up with the balance of keylevers, keytops, weights and cam frames from the Linotype's original keyboard.

Among the accessories included with the TTS equipment are new assembling elevator front and back plates. For further assurance of good assembling of matrices it is advisable to have a new back rail and assembling elevator gate, when a Linotype now in use is to be TTS equipped.

Operating Units in general are interchangeable between general purpose Linotypes equipped with Adapter Keyboards.

No motor is used on the Operating Unit, which is belt-driven from the intermediate shaft of the Linotype.

The Transmitter Distributor

ILLUSTRATED and described on page 27, this is the primary instrument used in wire transmission, either for a local room-to-room transmission of perforated tape, or for the connection of any plants at any distance. For such purposes the tape produced on a Perforator (either style) is immediately fed into the Transmitter Distributor, which translates the code signals from the holes in the tape into electric impulses. These go out by wire and, at their destinations (one or more), they operate either or both of the two receiving instruments described below.

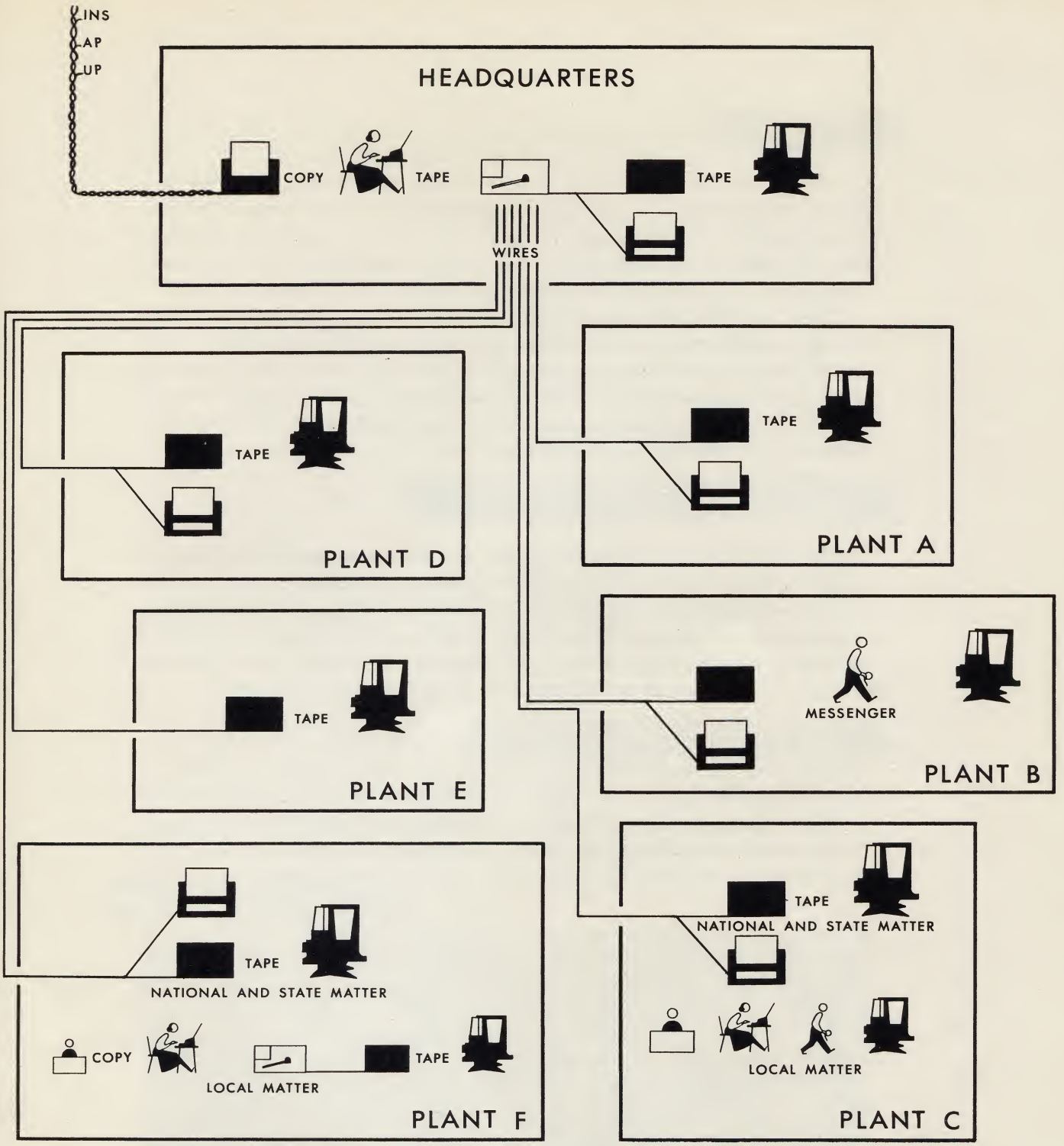
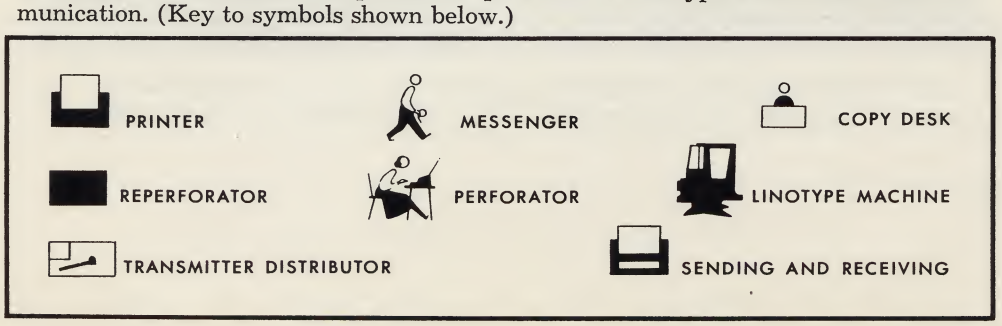


Diagram of a TTS Circuit Operation in which six plants are supplied with wire services, edited at the Headquarters plant. The Headquarters plant and plants C and F use TTS for local matter. All plants except E have a Teletype Printer for intercommunication. (Key to symbols shown below.)



The Reperforator

AS SHOWN on page 28, this device, at the receiving station for any TTS wire transmission, automatically reproduces the TTS tape. Whether or not the Model 20 Sending and Receiving Printer (described below) is used, the Reperforator is always used to provide tape for the Operating Units on Linotypes at every reproducing point.

When Perforators are installed away from the composing room (in editorial departments, in classified offices, or in suburban offices) wire transmission with the Transmitter Distributor and Reperforator obviate all necessity for carrying the tape itself from one point to another. Some plant executives find it pays thus to move tape electrically even from one room to another in the same building.

The Teletype Model 20 Sending and Receiving Printer

THIS MACHINE will transmit and receive messages, from six-unit tape, in upper and lower case. When connected to the Teletypesetter circuit the printer will provide a typewritten copy of the contents of tape in lines which will justify. This machine differs only from news service printers in that the news service printers operate on a five-unit tape and are therefore limited to upper case.

SELECTING AND TRAINING TTS PERSONNEL

TELETYPESETTER CORPORATION operates a maintenance school at their factory in Chicago for the instruction of customers' personnel. The maintenance course covers two weeks of intensive training and classes are scheduled regularly throughout the year. Advance registration is re-

FIGURE 14.—*Multiface Perforators* in operation in a large book manufacturing plant, showing the use of tables, individual fluorescent lights and posture chairs.

quired. No tuition is charged. Teletypesetter Corporation will advise applicants as to convenient living accommodations, if desired.

Every TTS equipped plant should have one mechanical executive with sound experience, or at the least the factory school training in TTS operation and maintenance. This man can then train his Linotype monitors in their special responsibilities. It has been found that any competent man readily acquires these added accomplishments.

Perforator operators, after careful selection as discussed later, may be trained locally (sometimes with the service of freelance instructors), or in the plant of a neighboring publisher.

Too much stress cannot be laid upon the importance of thorough training of operators. The difference between fair operators and top-flight operation will mean thousands of dollars gained or lost in production efficiency over a period of years.

While the first measure of the candidate's ability is the capacity to type by touch system 60 words a minute for ten minutes (with no more than five errors), it does not necessarily follow that a fast and accurate stenographer will be equally fast and accurate on the Perforator. Experience in several large composing rooms has proved otherwise. This has led to the belief among many users of TTS that applicants for Perforator operators should be tested in advance by persons qualified to administer various aptitude tests.

The Minnesota Test of Clerical Ability is sometimes used—it measures speed and accuracy with both numbers and figures. The detection of spelling inaccuracies is another test. Since speed of finger movement is important, a verifying test, known as a sub-test of the McQuarrie Test of Mechanical Ability, is sometimes given.

Another recommended test is the Minnesota Rate of Manipulation Test which measures mind-muscle coordination and finger dexterity. In most plants there are several operators working together in close quarters, therefore their ability to get along with others is most important. To reveal anti-social tendencies, employer-employee adjustment, nervous tensions, and self-reliance there is a California Test covering those essential factors.

Since it is usually not possible for a personnel executive or plant superintendent to do such testing, which requires definite professional training, there is a convenient resource, available in most cities and towns, at the local U. S. Employment Offices. They are usually prepared to give such tests. Or a nearby college or university may be able to cooperate.

If operator training is to be given in the local plant, then great care should be taken to provide adequate facilities and qualified training personnel.

After it has been established that the trainee has the proper qualifications for this work, and the general relationships of Teletypesetter and Linotype have been explained, the period of practice operation begins.

Then it is important to emphasize accuracy before any effort is made to achieve speed. Publishers who have used TTS for a number of years agree that it is unwise to measure the production of trainees for at least the first thirty days. This should be made clear to the trainee, thus eliminating any conscious effort to achieve speed at the sacrifice of a soundly laid foundation of accuracy. Of course that foundation is likewise built on understanding of the unit-count principle, line count, spacing, style and word division.

At the end of six to eight weeks of intensive training a Perforator operator should be able to produce about 200 lines of newspaper body type an hour. Within six to eight months about 400 lines an hour is a reasonable expectation. The variations in individual capabilities and aptitudes, as well as clean and well-edited copy, are naturally factors in the development of speedy and accurate operation.

A plant style book, previously mentioned for its value in general production, is naturally a most useful training tool. One of the larger newspapers has prepared such a book with the title "A Guide for Teletypesetter Operators." This is very fully illustrated with reproductions of all the different parts of the paper, each analyzed as to type arrangement, spacing, and the interpretation thereof on the Perforator keyboard. Since such a manual will vary with different publications no effort has been made thus far to publish a book for these purposes, despite its immediate value for training needs as well as in routine operation.

TYPOGRAPHIC DATA

THE NECESSITY FOR proper spacing and justification of the composed line led to the development of a counting system for matrix widths, which in turn, called for unit-width matrices. Only in later years came the Multiface Perforator with its capacity to handle normal text faces.

In the newspaper field the Standard Perforator, with unit matrices, has been generally preferred. This Perforator is somewhat simpler in mechanism and more responsive to the operator's touch than the Multiface Perforator. Therefore it is important to have a general understanding of the typographic considerations in the manufacture and use of special unit matrices.

It has been noted that the special Linotype matrices for Teletypesetter use with the Standard Perforator are made on a system of eleven different set-widths. This groups all of the capitals, lower case, figures, points, etc., comprising a complete font of matrices, into the eleven widths.

The Set Principle

THE Special Teletypesetter matrices, made on the eleven-unit basis, are designated by "set" as well as by their usual Linotype name, size, and

triangle number. The "set" designation is decidedly important in planning TTS equipment and notably in group or circuit operations, because *any faces having the same set can be composed by one punched tape.*

The term set denotes, in type points, the set-width of the "em" quad (or the capital M) of the given face, being the overall brass width of the matrix, as measured in points. Thus an "8-set" face has an em quad 8 points wide and all the unit relationships of that face are based on that dimension.

Set and Alphabet Length

DISCUSSIONS and correspondence about Special TTS matrices frequently use *alphabet length* as a term of comparison. That factor comprises the length of the lower-case alphabet, expressed in type points, for any stated face. Alphabet length is always stated in the descriptive line that covers every specimen showing of a Linotype face.

Set and alphabet length are identically related in Special TTS matrices. As shown on page 39, all faces of the same set have the same alphabet length.

In plants using the Multiface Perforator the alphabet length of the regular Linotype font (*not* on a unit basis) is the single overall measurement of the face. Thus regular Linotype faces have no assigned set factor.

The Mathematics of Set

THE RELATIONSHIPS of the set system are mathematically simple though the dimensions of matrices are stated in ten-thousandths of an inch. The width of a single unit is established by dividing the em quad width (or the capital M width) into 18 equal parts. Then multiples of that 1/18 dimension become the widths of the eleven different unit groups. For instance, the lower-case "i" is made 6/18 of the width of the em quad.

The eleven unit groups, in any Special TTS face, in terms of the 1/18 unit are 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18. Each keystroke of a type character on the Perforator Keyboard translates through the counting mechanism a corresponding number of units into the accumulating total for the composed line, as shown by the Indicator Scale. While the actual width of each unit varies with the set-width of the face, the unit relationships within each font remain unchanged.

The table on page 37 shows the Character Grouping by Units of a typical font of Special TTS matrices. To keep this table simple, as a demonstration of the unit system, no brass dimensions of the matrices are included—it is just the unit system which covers all the newspaper body faces comprising Linotype's TTS Legibility Group.

Set May Differ from Point Size

ONLY WHEN the em quad of a type face happens to be the same number of points wide as the body size of the face, are the set and body dimensions identical. Thus 8-point Corona with Erbar Bold happens to be 8-set. But 8-point Excelsior with Memphis Bold is 8.66-set. Comparing those two faces, by set and by alphabet length, we find the Corona to be about 7½% narrower in design than the Excelsior. In composition this would mean a difference of about two type characters in the 12-pica line. Thus the difference in set of these two 8-point faces would completely defeat the counting system of TTS if a proper allowance for set were not made.

On page 38 is shown the full range of set classifications of Special TTS matrices. For each set-width is shown the corresponding width of one unit, the total of 18 units, the alphabet length of that face group, and the TTS Specification Number which controls the Indicator Scale settings on the Standard Perforator.

Identical Set-Widths are Vital in Circuit Operation

SINCE one TTS tape, punched for a given face, will compose all faces having the same set, this principle controls group or circuit operations in which a central headquarters plant produces tape to operate all the Linotypes of the wire-connected group.

While the set principle limits a circuit operation to faces of one set, Linotype provides a variety of faces within the set groups comprising the most-used body sizes. Thus a circuit plan of operation needs a basic agreement on set size only. Any face of the agreed set may be used on any paper of the circuit to be served by one headquarter's TTS tape.

It has been noted that the leading, or separation between individual lines of body matter, may vary at will. That is individually controlled by molds on the Linotypes, whose liners determine slug thickness.

To demonstrate the possible variations in type-face equipment among the members of a single group operation, all controlled by one central TTS tape, the following faces might be used simultaneously. Each of these faces is 8-set, with an alphabet length of 118 points:

7 point Excelsior with Bold Face No. 2.
7 point Excelsior with Gothic No. 3.
7 point Ionic No. 5 with Bold Face No. 2.
7½ point Corona with Gothic.
7½ point Corona with Bold Face No. 2.
7½ point Excelsior with Bold Face No. 2 (8).
7½ point Ionic No. 5 with Bold Face No. 2 (8).
8 point Corona with Erbar Bold.
8 point Corona with Bold Face No. 2.

Non-technical readers are advised that the above listings show first the body face and then the bold face (or italic) which is available on the same matrix in all two-letter matrices.

Newspaper Faces in the Linotype Special TTS Legibility Group

TO PROVIDE variety in selection, both for the personal preferences among buyers and to meet varying printing conditions, Linotype has manufactured especially for TTS requirements a representative selection of the most popular newspaper faces. (Page 39.)

The following faces are all members of Linotype's Legibility Group, designed for maximum readability. This listing is grouped into classifications of identical set and alphabet length, for ready comparison. The TTS Specification Number covers their data on Perforator settings, etc.

CHARACTERS GROUPED BY UNITS IN A FONT OF TTS SPECIAL MATRICES

Number of Units	Characters of this Unit Width
6	Period Comma Apostrophe Hyphen Vertical Rule Quote Thin Space i l
7	j f t
8	I
9	All Figures Dollar Mark Pound Sterling Semi-Colon Colon Exclamation Point En Leader Asterisk Left and Right Hand Brackets All Reference Marks Figure Spaces En Dash ( ) r s z
10	c e o
11	a b d g h n p q u v x y k fi fl J S ?
12	Z
13	C T L ff
14	A B F O P Q V & æ
15	D E G R U X Y H K N w œ
18	Em Space Em Leader Em Dash @ % ŧƀ Em Fractions M W Œ Æ m ffi ffl

Plus an extra channel of Em Spaces cut to run in ffl channel

No Difference in Appearance Between TTS and Regular Matrices

THE READER can scarcely detect the microscopic differences in set-width between Special TTS and regular Linotype matrices for the same face. Thus Teletypesetter composition may be combined, in makeup, with type composition from regular matrices in the same face. The difference in set-widths, while vital for the TTS counting system, does not materially affect the letter shapes.

An individual specimen folder of Linotype's resources in Teletypesetter unit-width matrices is available on request. This shows the more than two-dozen different faces available, ranging from 5½ to 11 point in size, arranged by "set" classifications. Keyboard diagrams for standard 90-channel layouts are included.

SET DATA AND UNIT WIDTHS OF ALL TTS SPECIAL MATRICES

Set of Face	Width of 1 Unit	Width of 18 Units	Alphabet Length	Teletypesetter Specification Number
6.3875	.0049	.0882	94	158
7	.00538	.0968	103.2	159
7.5	.00577	.1038	111	176
8	.00615	.1107	118	160
8.25	.00634	.1141	121.9	481
8.5	.00653	.1176	125.67	482
8.66	.00666	.1199	128	175
9	.00692	.1245	132.9	171
9.5	.0073	.1314	140.4	365
10	.00769	.1383	147.6	208
11	.00845	.1522	162.3	383

Field Experience with Unit Set

NO recommendation of a set size for Teletypesetter operation can be made without careful analysis of all factors bearing on the individual problems of each installation.

Field experience has shown that the greatest number of lines per hour have been produced using a Perforator on the 8-set. Teletypesetter Corporation has recommended this set for optimum performance on 12-pica measure.

However, the fact that adequate and profitable performance is possible using a larger set size is attested by the fact that numerous installations, large and small, are successfully using 8.5 and 8.66 set.

In view of a growing demand for a larger type, it will often be found impossible to have both 8-set performance and larger, wider, design characteristics.

Type faces on 8-set have a lower-case alphabet length of 118 points. But only three of the nine 8-point types now available for Teletypesetter use are in this (8-set) classification. The other six available 8-point faces average 126 points in alphabet length in their normal or non-unit versions, and are on 8.66 set for Teletypesetter use.

The 8-point faces available on the 8-set are legible and popular. They give the appearance of a large letter because of an increased height of the characters, yet the width of each character is no more than comparable letters of a half-point smaller face. No sacrifice of word count is therefore incurred by adoption of the larger size.

LINOTYPE SPECIAL TTS UNIT-BASIS NEWSPAPER BODY FACES

Set Size	Point Size	Face Name	Linotype Number	Alphabet Length pts.	TTS Spec. No.
6.3875	5½	Ionic No. 5 with Bold Face No. 2	5½△52	94	158
7	5½	Excelsior with Bold Face No. 2	5½△62	103.2	159
7	6	Excelsior with Bold Face No. 2	6△374	103.2	159
7	6	Excelsior with Italic	6△450	103.2	159
7	6	Excelsior with Gothic No. 3	6△324	103.2	159
8	7½	Corona with Gothic	7½△34	118	160
8	7½	Corona with Bold Face No. 2	7½△44	118	160
8	8	Corona with Bold Face No. 2	8△228	118	160
8	8	Corona with Erbar Bold	8△264	118	160
8	7	Excelsior No. 1 with Bold Face No. 2	7△144	118	160
8	7	Excelsior No. 1 with Italic	7△194	118	160
8	7	Excelsior No. 1 with Gothic No. 3	7△160	118	160
8	7	Ionic No. 5 with Bold Face No. 2	7△150	118	160
8	7½	Excelsior with Bold Face No. 2	7½△46	118	160
8	7½	Ionic No. 5 with Bold Face No. 2	7½△48	118	160
8.5	7½	Excelsior with Memphis Bold	7½△40	125.67	482
8.5	7½	Paragon with Bold	7½△42	125.67	482
8.66	7½	Excelsior with Bold Face No. 2	7½△22	128	175
8.66	8	Corona No. 2 with Bold Face	8△224	128	175
8.66	8	Excelsior No. 1 with Bold Face No. 2	8△480	128	175
8.66	8	Excelsior with Memphis Bold	8△286	128	175
8.66	7½	Ionic No. 5 with Bold Face No. 2	7½△12	128	175
8.66	8	Ionic No. 5 with Bold Face No. 2	8△518	128	175
8.66	8	Paragon with Paragon Bold	8△200	128	175
9	9	Excelsior with Bold Face No. 2	9△190	132.9	171
9	9	Excelsior with Italic	9△188	132.9	171
9.5	9	Ionic No. 5 with Bold Face No. 2	9△164	140.4	365
10	10	Excelsior with Bold Face No. 2	10△452	147.6	208
11	11	Excelsior with Bold Face No. 2	11△156	162.3	383
11	11	Excelsior with Italic	11△154	162.3	383

IN the above listing the popular 8-set news face alphabet length is shown as 118 although the full decimal is actually 118.1.

However, as a matter of personal taste, some publishers have preferred more rounded and open letter forms rather than specially designed 8-point faces.

The typographic resources available make it possible to satisfy the requirements of every publisher. In 8-set the following sizes are provided: 7 point, 3 faces; 7½ point, 4 faces; 8 point, 2 faces. In 8.5 set: 7½ point, 2 faces. In 8.66 set: 7½ point, 2 faces; 8 point, 4 faces.

Therefore bearing in mind the relative production to be expected from each set size to which a Perforator may be adjusted, and considering the legibility requirements of the publisher, it should be possible for each individual user to select a face which will result in the least compromise.

In a chain or circuit operation it is obvious that some concessions must be made in order to achieve a standard.

Type Faces with the Multiface Perforator

PLANT EXECUTIVES, considering the application of TTS to book, periodical and commercial printing may meet their typographic needs with any of the standard roman faces made on Linotype matrices, 5 through 14 point. In the description of the Multiface Perforator it has been noted that the counting blades in its magazines must be arranged in accordance with brass widths of the matrices to be counted. These widths vary somewhat with different faces—they may be tabulated either by micrometer measurements of the matrices themselves or the data will be furnished, on application to the Director of Typographic Development, Mergenthaler Linotype Company, 29 Ryerson St., Brooklyn 5, N. Y.

Spacebands on TTS Linotypes

"SPECIAL TAPER" Linotype spacebands provide the necessary range of "spread" to cover the spacing requirements of the Teletypesetter. With a minimum thickness of .0369″ they provide for close spacing, while their maximum of .1219″ gives ample expansion for more open spacing.

In book composition, with wider measures, Linotype "Wide Range" spacebands have ample range of spread, with a minimum of .0345″ and maximum of .1194″.

For the Analysis of Unusual Typographic Problems

TYPE COMPOSITION, in all its varieties and technicalities, is the primary business of the Linotype Production Engineer who covers the world-wide fields of printing and publishing. In the recent developments that have so rapidly widened the use of TTS, many representatives have had close personal contact in the shaping of equipment and operating plans. This experience is useful and it is freely interchanged throughout

the Linotype organization, together with close cooperation from Teletypesetter's organization, to provide the answers to new questions as they may arise. Therefore the Linotype representative should be first consulted for further information. If his own immediate experience does not furnish the answer, he knows where to find it.

It should be borne in mind that standard TTS equipment and specifications should be used except in cases where the requirements of an individual office dictate a departure from normal. Although such a departure is possible, it may limit the scope of Perforator operation.

THE LINOTYPE COMET AND TTS

EXECUTIVES of printing and publishing plants whose natural instinct for things mechanical has led them to study the details of Teletypesetter functions, have often challenged the production limits of 7 to 8 lines a minute when TTS is coupled with general-purpose Linotypes. This has led to prolonged experiments with these standard Linotypes in the various models made for the many different requirements of general typesetting. Such tests have shown that the top speeds of 8 lines, or thereabouts, are definitely the limits of the basic machine design. The question: how to change the machine for higher speed?

To find an answer demanded research—prolonged and involved research, for the relationships of the interlocking mechanisms of a Linotype are intimate. Change the performance of one function of the machine and the whole Linotype is inevitably affected.

More lines per minute mean more matrices flowing through the assembling, casting, and distribution mechanisms. At certain points the moving matrices are directly impelled by gravity. In their travels through magazines a measurable bit of friction in the channels that guide them retards their movement and thus becomes a factor in the speed with which they can be composed.

To let gravity gain a stronger pull on the sliding matrices a magazine could be placed in a nearly vertical position. But that would change its dove-tailing connections to mechanisms at its top and bottom—fundamental changes going clear to the framework of the machine.

Faster dropping matrices from a magazine at a new angle would change the whole technique of gathering, each one in proper sequence, on a fast-moving conveyor belt, to be assembled without transpositions in a composed line. Five hundred or so matrices a minute must thus be held in a completely ordered sequence if higher speeds were to be achieved. Only high-speed photography with electronic timing, followed by slow-motion analysis, could enable research workers to solve this problem of more rapidly descending matrices, despite all that had been learned in sixty years of building general-purpose Linotypes.

If machine movements were to be doubled in speed then bearing sur-

faces and points of impact must be re-designed for new duties. Cam relationships—and Linotype is a network of cams—demanded new contours for new timing.

Casting conditions, at 12 slugs a minute, called for new features in heating typemetal and in cooling the molds.

Proceeding with these many phases of completely new machine reactions, this program of research developed a new and different Linotype—the Blue Streak Comet. The challenge was met—the Comet's 12 lines a minute, operating automatically with Teletypesetter, were a sensation at the 1950 Graphic Arts Exposition in Chicago.

The Features of the Comet

OF PRIME INTEREST in this discussion of Teletypesetter operations are those features of Comet's construction that tie it so successfully to this means of automatic operation at high speed.

Two-magazine capacity on the Comet provides for quick changes back and forth between news and classified type.

Standard Linotype magazines, used on the Comet, are interchangeable with those on other Linotypes. They are placed at an angle of 70 degrees instead of 37 degrees as on the general-purpose Linotypes. Gravity has a more positive pulling force on matrices held in channels placed at this more nearly vertical angle.

Magazine shifting is accomplished easily with a conveniently placed lever at the right of the magazines. A spiral spring counter-balances the shifting device and the whole mechanism is very simple.

The keyboard is of standard Linotype design and layout. That is as important as the standard magazine in preserving the essentials of unity in equipment, vital to operation and efficient maintenance. The standard keyboard on the Comet is ready for standard manual operation when desired, or for the application of the Comet TTS Operating Unit and Comet TTS Adapter Keyboard and accessories.

Direct release of matrices is effected on the Comet by a new direct action from the keyboard to the escapement plungers, eliminating levers and contributing to speed. The entire front of the machine opens up like a door for full accessibility to the keyrod assembly, which can thus be readily removed for cleaning. A new double "e" device has been designed for the new speed of release, and is simple and easy to maintain.

For casting 12 lines a minute twin molds are used alternately, effectively cooled by Thermo-Blo, with special developments to disperse the doubled volume of heat from the molten metal being cast.

For mold turning at nearly doubled speed, an auxiliary camming arrangement eliminates the shock of impact between the mold turning segments and the bevel pinion. Smooth and quieter operation results.

The Micro-Therm electric pot, as developed for the Comet, has new

features. Greater efficiency comes with improved contacts between the crucible throat and the heaters, which are now cast in smoothly machined aluminum blocks. New controls provide the essential balance of heat between crucible and mouthpiece, with separate dial adjustments for each.

The Comet distributor has a new clutch, which is extremely sensitive and reduces the possibility of damage to stuck matrices. For TTS operation, throw-out action of the distributor clutch closes a small switch which stops the Operating Unit.

The Comet Self-Quadder embodies all the features of the new Linotype Quadder, with full provision for automatic control by TTS tape. To center, to quad right, or to quad left the Perforator operator merely touches the corresponding button on the keyboard. Code signals do the rest and completely automatic operation of the Quadder results. This is still another factor for speed, not only in assembling and casting open lines but in perforating them on tape.

Production Conditions with the Blue Streak Comet Linotype

TEST RUNS with the Comet, equipped with the Comet Teletypesetter Operating Unit and with the new Self-Quadder, indicate the following production factors.

The Comet can produce up to 12 lines a minute, setting 8-point type on a 12-pica slug.

A general-purpose Linotype, TTS equipped, produces 7 to 8 lines a minute.

A manually-operated general-purpose Linotype has a normal factory speed of 6⅓ lines a minute, but the often cited average is 4 lines a minute.

Thus, the Comet's TTS production is virtually double the factory speed of a manually operated general-purpose Linotype and is triple the average production so often reported in national surveys.

One monitor should be able to maintain full production with Teletypesetter operation on three Comets, given normal conditions on flow of tape, with the latter cleanly punched.

Three Comets, producing at 12 lines a minute, will call for the average production of four Standard Perforators, each operated at the frequently cited proficiency standard of 400 lines an hour.

New Standards of Plant Efficiency Will Be Achieved with Comet Linotypes

NEW OPERATING STANDARDS of efficiency come to the composing room with a battery of Blue Streak Linotype Comets.

Comets equipped with Teletypesetter will reduce the number of line machines for a given operation by at least one-third as compared with general-purpose Linotypes with TTS.

In a plant now manually operating general-purpose Linotypes,

Comets with TTS will reduce the number of line machines by one-half or more.

These new production standards mean:

Less capital investment.
Less floor space.
Less maintenance costs.
Substantial payroll savings.
Better facility in meeting deadlines.

"How can we get increased production in typesetting at lower costs?"

A battery of TTS-operated Comets will bring a most emphatic answer to this pointed question.

☆ ☆ ☆

Substantial assistance was received from executives of the Teletypesetter Corporation, Chicago, Illinois, in the editing and illustrating of this handbook. Their cooperation is gratefully acknowledged.

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Dallas	514 Browder Street
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Representatives in all Principal Cities

Set in Linotype Textype, Gothic No. 20 and members of the Erbar Family
Printed in U. S. A. 610.40.1-K-PP-5X